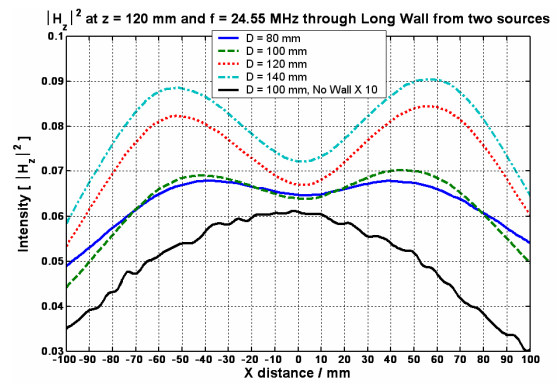


Sub-wavelength RF imaging with magnetic metamaterials

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Materials with negative refractive index can focus both the propagating and the evanescent fields, thus giving the potential for sub-wavelength imaging. In the extreme near field, the electric and magnetic fields are independent, so a negative permeability, μ , is sufficient to focus magnetic fields. We have constructed a 60 mm thick, 2-dimensional isotropic wall, of “Swiss Rolls”, a magnetic metamaterial tuned to operate with $\mu = -1$ near 25 MHz, where the wavelength of electromagnetic radiation in free space is ~ 12 m. We placed two collinear magnetic sources, spaced between 80 and 140 mm apart, behind the wall, and measured the intensity of the magnetic field in the “image” plane, 120 mm away from the sources. Without the wall, no structure is observed, but, when the wall is present, we find two peaks, whose separation varies with that of the sources, thus demonstrating an imaging resolution of $\lambda/100$.



$\lambda/100$ Imaging at 24.55 MHz